

Two New Doliolids from the Eastern Pacific Ocean¹

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THE MATERIAL upon which this report is based was collected during the Shellback Expedition carried out by Scripps Institution of Oceanography in 1952. This expedition conducted its work in the east central Pacific Ocean off Central America and northern South America. While the authors were examining the many plankton samples they found two unusual doliolids. These specimens were from samples taken in the waters off Peru. The specimens are all gonozooids; and although they are not in a good state of preservation, the arrangements of muscles, alimentary organs, and gonads have been determined by close examination, after staining with Rose Bengal. One of the two forms belongs to the genus *Doliopsoides* established by Krüger (1939: 138–139). This genus, in the appearance of the musculature, shows an intermediate state between the *Cylomyaria* and the *Desmomyaria*. The other form belongs to the genus *Doliolina*. Both forms differ from any previously described species known to us and we consider them to be new species.

This is the first reported occurrence of the genus *Doliopsoides* from the Pacific Ocean and, indeed, is the first report of the genus since it was described by Krüger. At present the known distributions of *D. horizoni* and of *D. undulatum* are limited to only two stations.

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Doliopsoides horizoni new species

Fig. 1

Three gonozooids are dealt with here. All were found in the sample from station SB-115 located at 8° 16' S., 83° 42' W. They are 3.9 mm., 4.6 mm., and 5.2 mm. in length. One additional specimen was taken at station SB-118 located at 9° 49' S., 83° 02.5' W. The body is roughly barrel-shaped with the oral aperture at the anterior end and the atrial aperture at the posterior end of the body. Both apertures are rather wide and fringed with a narrow margin which is, apparently, without lappets. The test is of moderate thickness, very soft, and easily stripped from the body. The mantle is extremely thin and delicate. The muscles are rather narrow, especially I, VII, and VIII. Muscles I through IV and VIII form complete hoops. The first and seventh intermuscular zones are narrow while the second is quite wide. Muscle V runs obliquely from the posteroventral to the anterodorsal side and is widely interrupted at the middorsal line. Each dorsal end of muscle V turns backwards for a short distance and then runs obliquely to the posteroventral side. These parts represent muscle VI and are arranged parallel to muscle V. They are not continuous across the mid-ventral line. There is a short section on each of the ventral ends of muscle VI which turns slightly forward. Each of the ventral ends of muscle VII passes external to muscle VI on the side of the body. Muscle VII ends slightly below the mid-ventral line, just after crossing muscle VI. In addition to these muscles there are two narrow, short connecting muscles (lateral longitudinal muscle, l.l.m.) between muscles IV

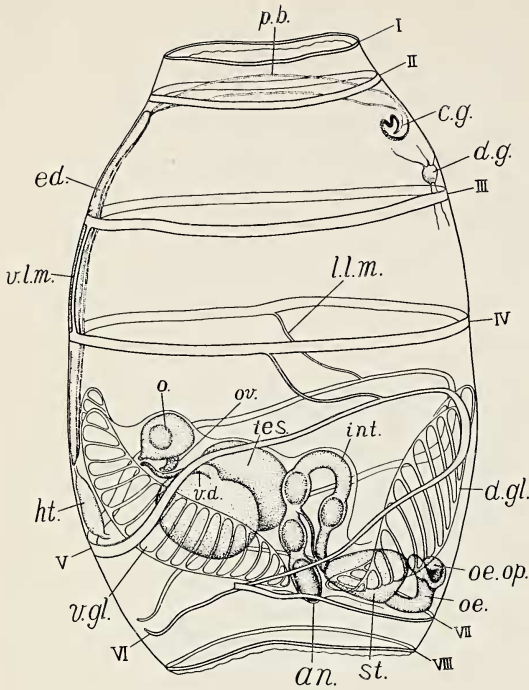


FIG. 1. *Doliopsoides horizoni* n. sp., gonozooid from left side. I-VIII, circular body muscles; *an.*, anus; *c.g.*, ciliated groove; *d.g.*, dorsal ganglion; *d.gl.*, dorsal gill; *ed.*, endostyle; *ht.*, heart; *int.*, intestine; *l.l.m.*, lateral longitudinal muscle; *o.*, mature ovum; *oe.*, oesophagus; *oe.op.*, oesophageal opening; *ov.*, ovary; *p.b.*, peripharyngeal band; *st.*, stomach; *tes.*, testis; *v.d.*, vas deferens; *v.gl.*, ventral gill; *v.l.m.*, ventral longitudinal muscle.

and V, one on each side of the body. These muscles extend from just below the mid-lateral portion of muscle IV obliquely upward, joining muscle V just above the mid-lateral line. Another narrow longitudinal muscle (ventral longitudinal muscle, *v.l.m.*) connects muscles III and IV along the mid-ventral line.

The endostyle (*ed.*) is long and rather thick although its consistency does not seem to be compact. Anteriorly it begins just behind muscle II and extends posteriorly to slightly beyond the middle of the fourth intermuscular zone. The anterior margins of the peripharyngeal bands (*p.b.*) project slightly in front of muscle II. The ciliated groove (*c.g.*) is located near the middle of the second inter-

muscular zone, the dorsal ganglion (*d.g.*) is in the same zone near muscle III. The gill consists of a dorsal (*d.gl.*) and a ventral pair (*v.gl.*) of lamellae. It extends dorsally to the level of the ends of muscle V and ventrally to the middle of the fourth intermuscular zone or slightly anterior to it. The dorsal and ventral lamellae approach just above the juncture of muscle VI and VII. The gill bears in all 30 to 40 elongate stigmata.

The oesophageal opening (*oe.op.*) is located on the dorsomedian line near muscle VII, the oesophagus (*oe.*) itself is strongly curved. The stomach (*st.*) is situated vertically and in outline roughly forms an elongate triangle with the pyloric portion the narrowest. The intestine (*int.*) forms a U-shaped loop in the sagittal plane of the body which ends with the anus (*an.*) near the pyloric end of the stomach. The proximal portion of the loop is somewhat thinner than the other portions and it is not certain whether this represents a hind stomach. The formation of fecal pellets was observed in all three specimens. Krüger in his description of *D. meteori* mentioned the formation of "Kotballen" in the intestine. There is a thin but distinct vessel connecting the pyloric portion of the stomach with the middle of the ventral branch of the intestinal loop. The ovary (*ov.*) is situated just dorsal to the posterior end of the endostyle and slightly to the right of the median line. In one specimen the ovary contains a large mature ovum (*o.*). The oviduct is so short as to be practically absent. The testis (*tes.*) is located between the ovary and the intestinal loop. It consists of two spherical lobes. The vas deferens (*v.d.*) is short but distinct, and extends from the testicular lobes to near the ovary, probably in the region of the female genital pore. The heart (*ht.*) lies between the posterior end of the endostyle and muscle V.

REMARKS

This form is evidently very closely related to *Doliopsoides meteori* (Krüger, 1939). Krüger's genus and species were described from a

plankton sample taken at Meteor station 267, in the layer between 400 and 200 meters, in the Atlantic Ocean off Cape Verde. Our specimens differ distinctly from Krüger's species in the following points: (1) The ventral longitudinal muscle connects muscles III and IV rather than muscles II and III as in *D. meteori*. (2) The oesophageal opening is situated on the middorsal line just anterior to muscle VII while in *D. meteori* it is located centrally on the level with muscle VI (see Krüger's fig. 87). (3) Muscle VI is interrupted at the mid-ventral line in *D. horizonsi* while it is continuous in *D. meteori*. In one part of Krüger's text figure the ventral ends of muscle VII are shown as if they passed internally to muscle VI, in another as if they passed externally to muscle VI. This apparent error may have been due to the poor condition of his specimens, but makes it impossible to compare the two species on this point. The specific name *horizonsi* refers to the vessel which carried the Shellback Expedition; this follows Krüger's lead in naming his species after the ship from which it was taken. Comparing the structures of *D. meteori* and *D. horizonsi* we have come to the conclusion that the genus *Doliopsoides* may be defined as follows:

Doliopsoides Krüger 1939: oozoid, trophozoid, and phorozoid unknown.

Gonozooid: The gonozooid is barrel-shaped with eight nearly hooplike muscles. Muscles I through IV and VIII form complete hoops while V, VI, and VII are interrupted. In addition to the circular muscles there are some longitudinal muscles, which are variously placed on the body. Both the ciliated groove and the dorsal ganglion are situated in the second intermuscular zone. The gill consists of a dorsal and a ventral pair of lamellae. The gonads are located antero-ventrally to the alimentary organs. Although there are some rather marked differences between our specimens and Krüger's description we do not feel they warrant more than specific treatment. The type species is *Doliopsoides meteori* Krüger 1939.

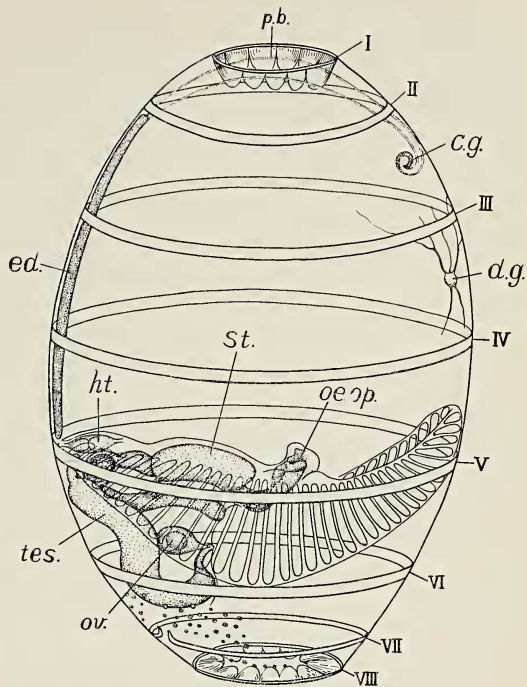


FIG. 2. *Doliolina undulatum* n. sp., gonozooid from left side. For abbreviations see Figure 1.

Doliolina undulatum new species

Fig. 2

This species is represented by five gonozooids from station SB-115 and four gonozooids from station SB-94. The location of SB-115 is given above, SB-94 was located at $9^{\circ} 58.5' S.$ and $95^{\circ} 01' W.$ These latter specimens are in a very poor state of preservation and we will deal here only with those from SB-115. They range from 3.3 to 4.6 mm. in length. The test is of moderate thickness but very soft and easily stripped from the body. The general appearance of the body and the arrangement of the eight circular muscles is quite similar to *D. intermedium* (Neumann, 1906), which occurs frequently in the Shellback area. A most striking difference is the interruption of muscle VII at the mid-ventral line in this new species. The mantle is thin. The muscles are narrow, especially I and VIII. Muscle VII is also somewhat narrower than the rest.

The endostyle (ed.) is very long, extending anteriorly nearly to muscle II and posteriorly to the anterior margin of muscle V. The anterior margin of the peripharyngeal band (p.b.) extends forward almost to muscle I. The ciliated groove (c.g.) is situated near the middle of the second intermuscular zone. The dorsal ganglion is situated in the third intermuscular zone, its posterior edge is at the middle of the zone. The gill septum extends from the middle of the fourth intermuscular zone dorsally, obliquely back to the level of muscle VI and then obliquely forward to the level of muscle V ventrally. It bears 30-40 pairs of elongate stigmata.

The oesophageal opening (oe.op.) is located approximately on the longitudinal axis near the posterior margin of muscle V. The stomach (st.) is located vertically at the same level; it is roughly rectangular in outline, slightly curved with the convex side forward. The intestine forms a simple loop and ends with the anal opening near the cardiac portion of the stomach and on a level with the middle of the fifth intermuscular zone. The hind stomach and mid-intestine are rather distinctly marked. There appears to be a thin short vessel connecting the pyloric end of the stomach with the middle of the posterior branch of the intestinal loop.

The ovary (ov.) is situated on a level with muscle VI, slightly to the right of the mid-ventral line. The testis (tes.) is somewhat sausage-shaped. It extends, with an undulating course, along the left side of the body between muscle V and the genital pore. There are a number of small cell groups scattered over the ventral half of the sixth intermuscular zone and on a small portion of the seventh intermuscular zone.

REMARKS

The oozoid, trophozooid, and the phoro-zoid of this species are unknown.

Gonozooid: At a glance the present new species may be confused with *D. intermedium* (Neumann, 1905: 211). The longer endostyle

in *D. undulatum* can be used as a good indicator to distinguish it from *D. intermedium*. In most of the specimens of *D. intermedium* collected in the Shellback area the endostyle reaches only slightly beyond the middle of the second intermuscular zone and its posterior end is located near the middle of the fourth intermuscular zone. The mid-ventral interruption of muscle VII is also unique in *D. undulatum*. *Dolioletta mirabilis* is the only doliolid, outside the genus *Doliopsoides*, which has an interrupted muscle band. In this case there is a mid-ventral interruption of muscle VI below the gut. The characteristic appearance of the testis, from which the specific name of the new species has come, is also unique and serves to separate the species from all others in the genus.

The following material, upon which part of the descriptions herein are based, has been deposited in the U. S. National Museum:

1. *Doliopsoides horizoni*, gonozooids, SYNTYPES, 3 specimens USNM Cat. No. 11368. These specimens were poorly preserved and it was felt impossible to designate a type from among them. They are all from station SB-115.

2. *Doliolina undulatum*, gonozooid, HOLOTYPE, 1 specimen USNM Cat. No. 11369.

3. *Doliolina undulatum*, gonozooids, PARATYPES, 4 specimens USNM Cat. No. 11370.

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